

CLAIMS

What is claimed is:

1. A computer implemented method comprising:
2 defining a spatial location across a series of pictures of an MPEG stream; and
3 for each picture of the series of pictures in the MPEG stream, partially decoding
4 the picture to determine an area of the picture falling within the spatial
5 location.

1 2. The method of claim 1 further comprising fully decoding at least the spatial
2 location in the picture, but not all of the picture.

1 3. The method of claim 1 further comprising forming a plurality of substreams from
2 the partially decoded MPEG stream.

1 4. A computer implemented method comprising:
2 decoding a picture of an MPEG stream into a plurality of slices having a set of
3 slices at least partially within an area of the picture, the area being less
4 than all of the picture;
5 decoding at least the set of slices but not the plurality of slices into a plurality of
6 macroblocks having a set of macroblocks within the area; and
7 decoding at least the set of macroblocks but not the plurality of macroblocks into
8 pixels.

1 5. The method of claim 4 wherein the area is a region of interest.

1 6. The method of claim 4 further comprising displaying the decoded set of
2 macroblocks.

1 7. A computer implemented method comprising:
2 creating an MPEG compliant substream from an MPEG stream including a
3 plurality of pictures, the substream corresponding to a region of interest
4 (ROI), said ROI being an area of each picture of the plurality of pictures
5 smaller than the total area of each picture; and
6 transmitting the substream.

1 8. The method of claim 7 further comprising synchronizing display of the substream
2 with a second MPEG compliant substream from the MPEG stream.

1 9. The method of claim 7 wherein the creation and transmission of the substream are
2 performed in a lock-step manner.

1 10. A computer implemented method comprising:
2 a client defining a region of interest (ROI) for each of a plurality of nodes;
3 the client transmitting an attribute file to the plurality of nodes, said attribute file
4 including the defined regions of interest;
5 the client broadcasting an MPEG stream to the plurality of nodes, the MPEG
6 stream having a series of pictures;

7 for each picture in the series of pictures of the MPEG stream, each of the plurality
8 of nodes,
9 partially decoding an area of the picture including at least the defined ROI,
10 fully decoding the defined ROI,
11 buffering the ROI; and
12 the client directing display of each picture in the series of pictures.

1 11. The method of claim 10, wherein the client commanding display of the picture
2 comprises:

3 waiting for a signal from each of the plurality of nodes that the ROI has been
4 decoded; and
5 transmitting a command to the plurality of nodes to display their ROI.

1 12. The method of claim 10 further comprising a lock-step mechanism for buffering a
2 fully decoded picture.

1 13. A computer implemented method comprising:
2 a client decoding a picture from an MPEG stream;
3 the client selecting a Region of Interest in the picture;
4 the client constructing a new MPEG picture corresponding to the region of
5 interest;
6 the client transmitting the new MPEG picture to a node; and
7 the client commanding the node to display the new MPEG picture.

1 14. The computer implemented method of 13 wherein the picture is an I-picture and
2 the client constructing the new MPEG picture comprises:
3 decoding the I-picture into a plurality of macroblocks;
4 storing the plurality of macroblocks into a plurality of data structures, each of the
5 plurality of data structures corresponding to a different one of the plurality
6 of regions of interest; and
7 forming a new MPEG compliant I-picture from the macroblocks stored in one of
8 the plurality of data structures.

1 15. The computer implemented method of 13 wherein the picture is a P/B-picture and
2 the client constructing the new MPEG picture comprises:
3 decoding the P/B-picture into a plurality of slices;
4 decoding each slice of the plurality of slices into a plurality of macroblocks;
5 if a macroblock of the plurality of macroblocks is an I-macroblock, storing the I-
6 macroblock into one of a plurality of data structures, each of the plurality
7 of data structures representing a different one of the plurality of regions of
8 interest;
9 if the macroblock of the plurality of macroblocks is a P/B-macroblock having at
10 least one reference macroblock and if the reference macroblock is out of
11 the represented region of interest, converting the P/B-macroblock into a
12 new I-macroblock;
13 if the macroblock of the plurality of macroblocks is a P/B-macroblock and the
14 P/B-macroblock is a skipped macroblock and follows a new I-macroblock

15 and the picture is a B-picture, converting the P/B-macroblock into a new I-
16 macroblock;
17 if the macroblock of the plurality of macroblocks is a P/B-macroblock and the
18 P/B-macroblock is a skipped macroblock and will occur at the beginning
19 or end of a new slice, converting the P/B-macroblock into a new I-
20 macroblock;
21 storing the new I-macroblocks and remaining P/B-macroblocks of the plurality of
22 macroblocks into the plurality of data structures;
23 forming a new slice with the macroblocks stored in one of the plurality of data
24 structures;
25 accumulating a plurality of the new slices; and
26 forming an MPEG compliant P/B-picture by encoding the plurality of the new
27 slices.

1 16. The method of claim 13, wherein the regions of interest are different spatial
2 locations of the picture which form the picture when combined.

1 17. The method of claim 13 wherein the regions of interest are overlapping areas of
2 the picture which form the picture when combined.

1 18. The method of claim 13 further comprising commanding a second node to display
2 a second new picture from the picture in synchronization with display of the new picture.

1 19. An apparatus comprising:
2 a network;

3 a first computer on the network,
4 to divide a picture of an MPEG stream into a plurality of regions,
5 to broadcast the picture over the network, and
6 a plurality of computers on the network, each of the plurality of computers,
7 to partially decode an area of the picture, said area of the picture
8 corresponding to one of the plurality of regions,
9 to fully decode the corresponding one of the plurality of regions; and
10 to display the fully decoded one.

1 20. The apparatus of claim 19 further comprising:
2 the first computer to transmit an attribute file over the network, said attribute file
3 having a definition of the plurality of regions.

1 21. The apparatus of claim 19 further comprising:
2 the first computer to synchronize display of the plurality of regions to form the
3 picture.

1 22. An apparatus comprising:
2 a network to connect a first computer to a plurality of computers;
3 the first computer
4 to construct a plurality of MPEG substreams from a source MPEG stream,
5 to transmit each of the plurality of MPEG substreams to a corresponding
6 computer of the plurality of computers, and

7 each of the plurality of computers to display one of the plurality of MPEG
8 substreams.

1 23. The apparatus of claim 22 further comprising:
2 the first computer to synchronize display of the plurality of MPEG substreams.

1 24. The apparatus of claim 22 further comprising:
2 each of the plurality of nodes to decode one of the plurality of MPEG substreams
3 with a conventional MPEG decoder.

1 25. An apparatus comprising:
2 a network to connect a client to a plurality of nodes;
3 the client to assign a region of an MPEG encoded picture to at least one of said
4 plurality of nodes, the region being smaller than the picture; and
5 each of the plurality of nodes to display its assigned region of the picture.

1 26. The apparatus of claim 25 wherein the client to assign each of the plurality of
2 regions comprises:
3 the client transmitting one of the plurality of regions to at least one of the plurality
4 of nodes.

1 27. The apparatus of claim 25 wherein each of the plurality of nodes display its region
2 of the picture in synchronization.

1 28. The apparatus of claim 25 wherein the client to assign each of the plurality of
2 regions comprises:

3 dividing the MPEG encoded picture into a plurality of new MPEG compliant
4 pictures, each of the plurality of new MPEG compliant pictures forming
5 the MPEG encoded picture when combined.

1 29. The apparatus of claim 25 wherein each of the plurality of nodes to display its
2 region of the picture comprises:

3 each of the plurality of nodes partially decoding the MPEG encoded picture; and
4 each of the plurality of nodes further decoding its region of the MPEG encoded
5 picture.

1 30. A machine-readable medium that provides instructions, which when executed by
2 a set of processors, cause said set of processors to perform operations comprising:
3 defining a spatial location across a series of pictures of an MPEG stream; and
4 for each picture of the series of pictures in the MPEG stream, partially decoding
5 the picture to determine an area of the picture falling within the spatial
6 location.

1 31. The machine readable medium of claim 30 that provides instructions, which when
2 executed by a set of processors, cause said set of processors to perform operations further
3 comprising fully decoding at least the spatial location in the picture, but not all of the
4 picture.

1 32. The machine readable medium of claim 30 that provides instructions, which when
2 executed by a set of processors, cause said set of processors to perform operations further
3 comprising forming a plurality of substreams from the partially decoded MPEG stream.

1 33. A machine-readable medium that provides instructions, which when executed by
2 a set of processors, cause said set of processors to perform operations comprising:
3 decoding a picture of an MPEG stream into a plurality of slices having a set of
4 slices at least partially within an area of the picture, the area being less
5 than all of the picture;
6 decoding at least the set of slices but not the plurality of slices into a plurality of
7 macroblocks having a set of macroblocks within the area; and
8 decoding at least the set of macroblocks but not the plurality of macroblocks into
9 pixels.

1 34. The machine readable medium of claim 33 wherein the area is a region of interest.

1 35. The machine readable medium of claim 33 further comprising displaying the set
2 of decoded macroblocks.

1 36. A machine-readable medium that provides instructions, which when executed by
2 a set of processors, cause said set of processors to perform operations comprising:
3 creating an MPEG compliant substream from an MPEG stream including a
4 plurality of pictures, the substream corresponding to a region of interest

5 (ROI), said ROI being an area of each picture of the plurality of pictures
6 smaller than the total area of each picture; and
7 transmitting the substream.

1 37. The machine readable medium of claim 36 that provides instructions, which when
2 executed by a set of processors, cause said set of processors to perform operations further
3 comprising synchronizing display of the substream with a second MPEG compliant
4 substream from the MPEG stream.

1 38. The machine readable medium of claim 36 further comprising a lock-step
2 mechanism governing the creation and transmission of the substream.

1 39. A machine-readable medium that provides instructions, which when executed by

2 a set of processors, cause said set of processors to perform operations comprising:

3 a client defining a region of interest (ROI) for each of a plurality of nodes;

4 the client transmitting an attribute file to the plurality of nodes, said attribute file

5 including the defined regions of interest;

6 the client broadcasting an MPEG stream to the plurality of nodes, the MPEG

7 stream having a series of pictures;

8 for each picture in the series of pictures of the MPEG stream, each of the plurality

9 of nodes,

0 partially decoding an area of the picture including at least the defined ROI,

1 fully decoding the defined ROI,

2 buffering the ROI; and

13 the client directing display of each picture in the series of pictures.

1 40. The machine readable medium of claim 39, wherein the client commanding

2 display of the picture comprises:

3 waiting for a signal from each of the plurality of nodes that the ROI has been

4 decoded; and

5 transmitting a command to the plurality of nodes to display their ROI.

1 41. The machine readable medium of claim 39 further comprising a lock-step

2 mechanism for buffering the fully decoded ROI.

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